

1. a. 2.3881 b. $\frac{47}{6}$ or 7.833

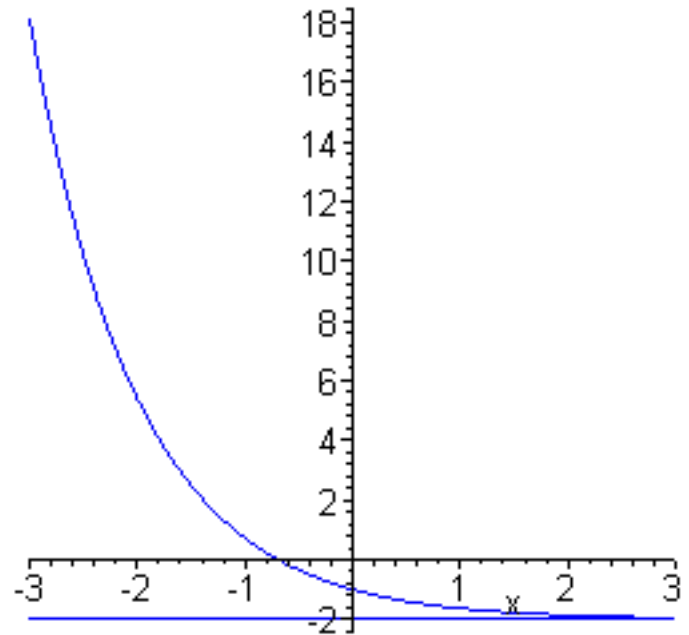
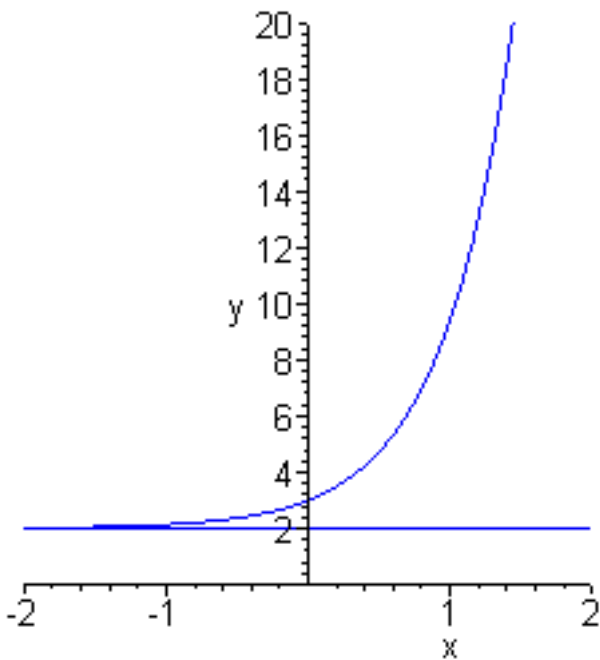
2. a. 0.34 b. 1.2564

3. $f(x) = e^{-x} - 2$

x -intercept: $(\ln(.5), 0) = (-0.693, 0)$

y -intercept: $(0, -1)$

Horizontal asymptote: $y = -2$ as $x \rightarrow +\infty$

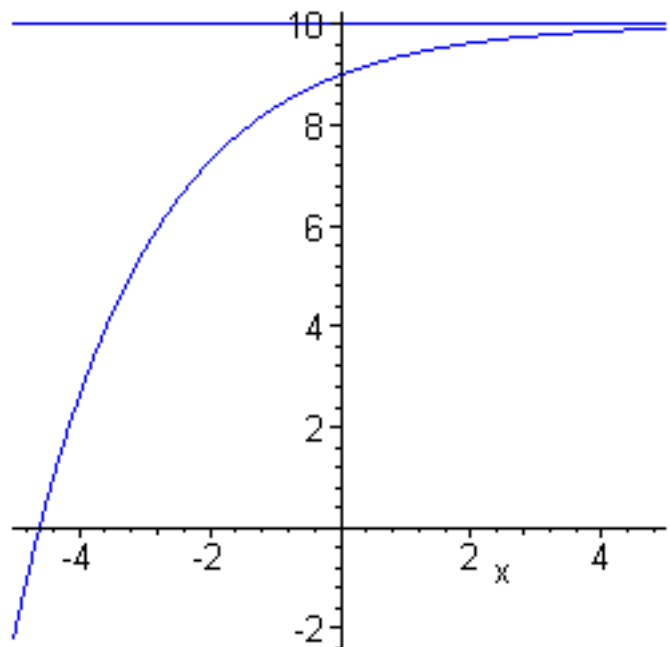


4. $f(x) = 2 + e^{2x}$

x -intercept: none

y -intercept: $(0, 3)$

Horizontal asymptote: $y = 2$ as $x \rightarrow -\infty$



5. $f(x) = 10 - e^{-x/2}$

x -intercept: $(2 \ln(1/10), 0) = (-4.605, 0)$

y -intercept: $(0, 9)$

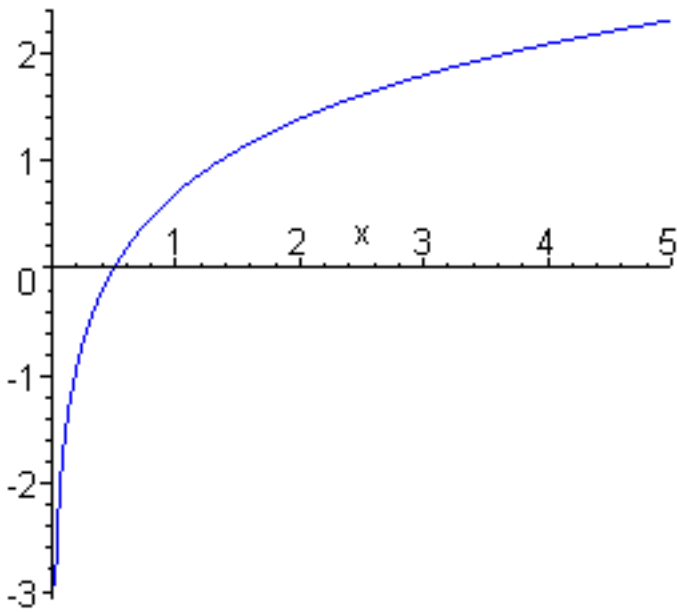
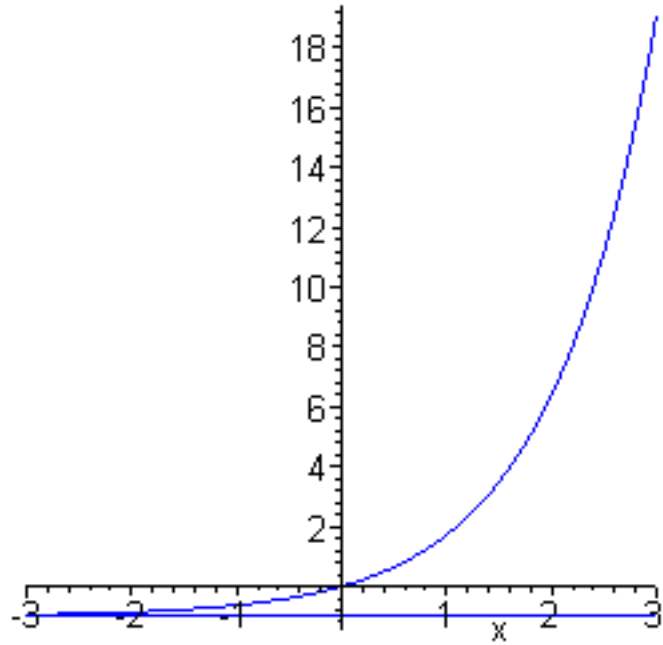
Horizontal asymptote: $y = 10$ as $x \rightarrow +\infty$

6. $f(x) = e^x - 1$

x -intercept: $(0, 0)$

y -intercept: $(0, 0)$

Horizontal asymptote: $y = -1$ as $x \rightarrow -\infty$



7. $f(x) = \ln(2x)$

Domain: $x > 0$

x -intercept: $(\frac{1}{2}, 0)$

y -intercept: None

Vertical asymptote: $x = 0$

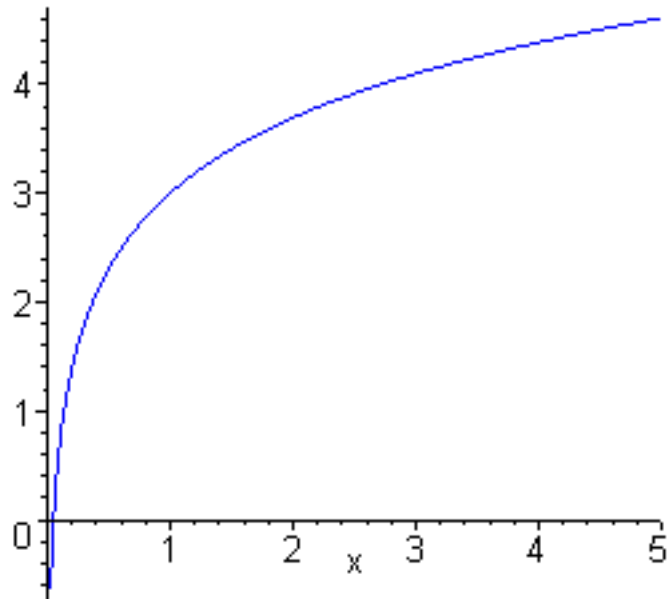
8. $f(x) = 3 + \ln(x)$

Domain: $x > 0$

x -intercept: $(e^{-3}, 0) = (0.0498, 0)$

y -intercept: None

Vertical asymptote: $x = 0$



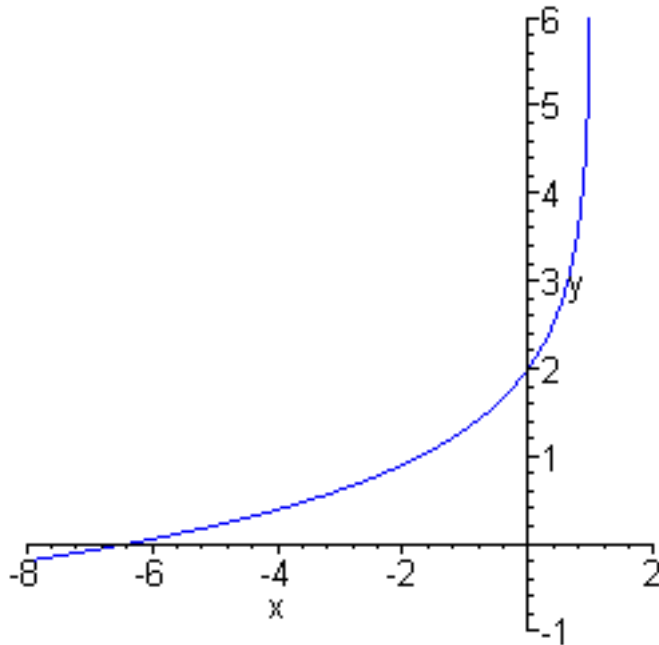
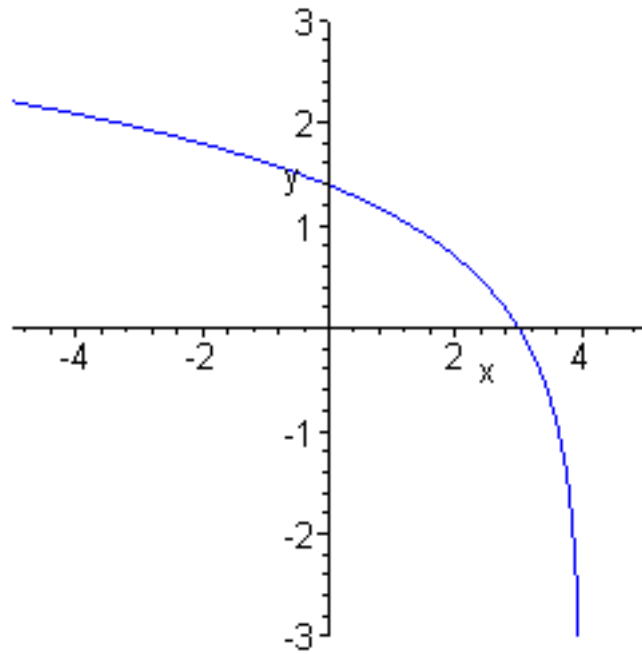
9. $f(x) = \ln(4 - x)$

Domain: $x < 4$

x -intercept: $(3, 0)$

y -intercept: $(0, \ln(4)) = (0, 1.386)$

Vertical asymptote: $x = 4$



10. $f(x) = 2 - \ln(1 - x)$

Domain: $x < 1$

x -intercept: $(1 - e^2, 0) = (-6.389, 0)$

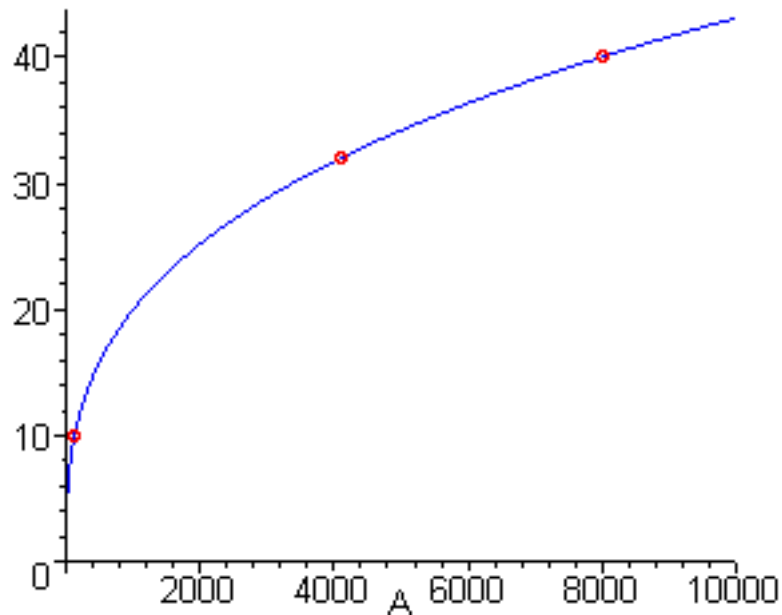
y -intercept: $(0, 2)$

Vertical asymptote: $x = 1$

11. a. An island with 125 km^2 should have about 10 species, while an island with 8000 km^2 should have about 40 species.

b. An island with 32 species should be about 4096 km^2 .

c. Sketch of the graph:



12. a. $a = -0.1110$ and $k = 7.558$, so $t = 7.558n^{-0.1110}$.

b. The winning times are predicted to be 6.998 min or 6 min 59.9 sec for pairs and 7.558 min or 7 min 33.5 sec for singles. Complications occur because eights have a coxswain, while fours may or may not have a coxswain. Singles are sculls with two oars for the oarman, compared to only oar for eights and fours. Pairs are similar to fours, so its time should be the best guess.

13. a. $a = 2.001$ and $k = 0.00728$, so $p = 0.00728v^{2.001}$.

b. A 13 mph wind should generate 1.234 watts, while it takes about a 16.6 mph wind to generate 2 watts.

14. a. $a = -0.2897$ and $k = 918.9$, so $P = 918.9w^{-0.2897}$.

b. The wren should have a pulse of 459 beats/min, while the dove should weigh about 855 g.

15. $a = 0.1595$ and $k = 60.93$, so $T = 60.93w^{0.1595}$. The 20 kg dog's erythrocytes should have an average lifetime of 98.3 days, and the animal with 100 day lifetime erythrocytes should weigh about 22.3 kg.

16. Most energy in mammals comes from generating heat. Heat is lost through the surface. Hence the amount of food is more closely related to the surface area, which goes as the square of the length. The amount of food that they should give him is closer to 144 (though a bit higher because of some volumetric losses like air from the lungs).