Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 2.4

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1. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} \frac{3x}{x-8}$$
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2. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} \frac{4x}{6x^2-8}$$
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3. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} \frac{4x^2+3\sin(x)}{x^2+9\cos(x)}$$
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4. (1 pt)
Find the following limit.
$$\lim_{x\to-\infty} \frac{-x+1}{|-6x-9|}$$
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5. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} \frac{x^{21}+5}{x^{20}+4}$$
If it does not exist, is it the limit ∞? enter **infinity**, $-\infty$? enter **-infinity**, or neither? enter **neither**. Do not type quotes in your answer.

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6. (1 pt)
Find the following limit.
$$\lim_{x\to\pi/2^-} \sec(x)$$
If it does not exist, is it the limit ∞? enter **infinity**, $-\infty$? enter **-infinity**, or neither? enter **neither**. Do not type quotes in your answer.

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7. (1 pt)
Find the following limit.
$$\lim_{x\to-\infty} \frac{8\cos(x)}{x}$$
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8. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} 4\sin\left(\frac{1}{x}\right)$$
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9. (1 pt)
Find the following limit.
$$\lim_{x\to\infty} \sqrt[3]{\frac{6x+2}{5x+5}}$$
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10. (1 pt)
Find the following limit.
$$\lim_{x\to-\infty} \frac{\sqrt{6x^2+7}}{x+7}$$
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11. (1 pt)
Find the horizontal and vertical asymptotes of the function $f(x) = \dfrac{8x^2-8x-2}{(2x-3)(x+3)}$

The horizontal asymptote is:
y = ____________________

The smaller of the vertical asymptotes is:
x = ____________________

And the larger is:
x = ____________________

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12. (1 pt)
Find the limit.
$$\lim_{x\to2.3} \frac{16x^2-24x}{|4x-6|}$$
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13. (1 pt)
Evaluate the following limit:
$$\lim_{x\to\infty} \frac{\sqrt{8x^3+5x+10}}{1x^2}$$
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14. (1 pt)
When a spaceship accelerates to speeds close to the speed of light, it appears to contract lengthwise. The formula for their apparent length is
$$L = L_0\sqrt{1-\frac{v^2}{c^2}}$$
where L_0 is the length of the spaceship when it is not moving, v is the velocity of the object, and c is the speed of light.

If the spaceship is 84 meters long at rest, and is moving at $v = 0.5c$, how long will it appear to be?

____________________ meters

As the speed of the spaceship approaches c, what is the limit of its length (i.e., what is $\lim_{v\to c^-} \sqrt{1-\frac{v^2}{c^2}}$)?

____________________ meters

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