

**Section 2.6: Additional Problems**

1. Evaluate the following.

$$(a) \lim_{x \rightarrow \infty} 6 + 2 \left( \frac{\pi}{2} \right)^x =$$

$$(b) \lim_{x \rightarrow -\infty} 6 + 2 \left( \frac{\pi}{2} \right)^x =$$

$$(c) \lim_{x \rightarrow \infty} 6 - 2 \left( \frac{\pi}{2} \right)^x =$$

$$(d) \lim_{x \rightarrow -\infty} 6 - 2 \left( \frac{\pi}{2} \right)^x =$$

2. Evaluate the following.

$$(a) \lim_{x \rightarrow \infty} 5 + \left( \frac{\sqrt{7}}{3} \right)^x =$$

$$(b) \lim_{x \rightarrow -\infty} 5 + \left( \frac{\sqrt{7}}{3} \right)^x =$$

$$(c) \lim_{x \rightarrow \infty} \frac{2}{5 + \left( \frac{\sqrt{7}}{3} \right)^x} =$$

3. Evaluate these limits

$$(a) \lim_{x \rightarrow \infty} 5x - 4x^6 =$$

$$(b) \lim_{x \rightarrow -\infty} 3x^7 + 4x^8 + 2 =$$

$$(c) \lim_{x \rightarrow -\infty} x^3 + 5 =$$

$$(d) \lim_{x \rightarrow -\infty} x^4 - 2x^5 + 5 =$$

4. Find a function that has a removable discontinuity at  $x = 5$ , a vertical asymptote of  $x = -3$  and a horizontal asymptote of  $y = 7$ .

5. Evaluate these limits

$$(a) \lim_{x \rightarrow \infty} \frac{6 - 3x^4}{2x^3 + 7} =$$

$$(b) \lim_{x \rightarrow -\infty} \frac{6 + 3x^5}{7 - 2x^3} =$$

6. Evaluate the following. Give exact answers.

$$(a) \lim_{x \rightarrow \infty} \frac{7e^{-4x} + 5e^{6x}}{3e^{6x} - 4e^{-3x}} =$$

$$(b) \lim_{x \rightarrow -\infty} \frac{7e^{-4x} + 5e^{6x}}{3e^{6x} - 4e^{-3x}} =$$

$$7. \lim_{x \rightarrow -\infty} \frac{x^2 + \sqrt{5x^6 + 6}}{6x^3 + 1} =$$

$$8. \lim_{x \rightarrow \infty} (2x - \sqrt{4x^2 + 3x + 1}) =$$

$$9. \lim_{x \rightarrow \infty} \frac{3x^4 + x^5 + 6}{7x^5 + 2x^3 + 7} =$$

$$10. \lim_{x \rightarrow \infty} [2 \ln(2x + 1) - \ln(2 + x^2)]$$

11. Find  $\lim_{x \rightarrow \infty} f(x)$  if, for all  $x > 1$ ,

$$\frac{12e^x - 15}{4e^x} < f(x) < \frac{3\sqrt{x}}{\sqrt{x-1}}$$